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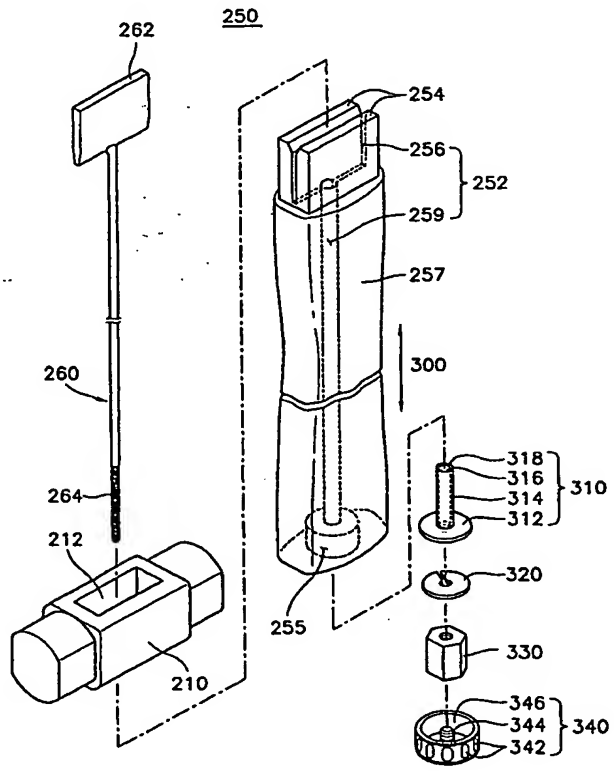
(54) Title: TOOL ASSEMBLY

(57) Abstract

A tool assembly for a stroke which reinforces engaging force between a striking portion and a handle portion and prevents wear of the handle portion. The tool assembly includes a striking portion having a through-hole, a handle portion the upper portion of which is inserted into the through-hole of the striking portion to act as a knob for movement of the striking portion, a regulating device which penetrates through the handle portion and regulates the engaging degree of the handle portion and the striking portion by moving longitudinally with respect to the handle portion, thereby deforming the upper portion of the handle portion towards a direction perpendicular to the striking direction of the striking portion, and a reinforcing member which is mounted in the handle portion and absorbs vibration generated by the regulating device and prevents friction between the regulating device and the inner surface of the handle portion, thereby preventing wear of the inner surface of the handle portion. According to the tool assembly, the engaging force between the handle portion and the striking portion can be easily regulated. The vibration generated during the work is absorbed by the reinforcing member, the vibration is not transferred to a hand of a user and noise is reduced.



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TOOL ASSEMBLY

Technical Field

The present invention relates to a tool which strikes an object, and more particularly to a tool assembly for a stroke which can improve a mutual engaging force between a strike portion and a handle and can prevent defacement of the handle and has a good appearance.

Background Art

In a conventional striking tool, especially in a hammer, in order to reinforce the engaging state of a iron portion and a handle, after the handle is inserted into a hole of the iron portion, a wedge is forcedly inserted into a gap between the hole of the iron portion and the handle from the tip of the handle. However, in the conventional striking tool, a problem with the engagement between the iron portion and the handle can be raised on time. For example, the engaging portion between the iron portion and the handle is so loosened that the striking work is inconveniently accomplished, or the iron portion is separated from the handle that the work becomes impossible.

The reason for the problem is that the iron portion and the handle are made of iron and wood, respectively, and that the external force exerted on the object when the object is inserted or separated by the tool is transferred to the handle, especially to the tip portion of the handle which is inserted into the hole of the iron portion and a neck portion which is located near the hole of the iron portion. For this reason, the tip portions and the neck portions of the handle are distorted and cracked. As a result, the engaging force between the handle and the iron portion when the wedge is forcedly inserted becomes weakened.

FIGs 1a and 1b show a conventional hammer assembly. In the hammer assembly, a cut-away portion 3 is formed in the middle of the inserting portion 2 which is formed at the tip end portion of a body 1 of a handle, and a reinforcing metal 4 is inserted into the cut-away portion 3 and is engaged with the handle by means of a rivet 5. In the conventional hammer assembly, since once the inserting portion 2 is inserted into a hole 7 of a iron portion 6, the reinforcing metal 4 reinforces the handle, the braking of the inserting portion 2 can be prevented.

However, in the hammer assembly, since the reinforcing metal is inserted in the cut-away portion, the engaging portion with the iron portion becomes split and therefore the supporting strength becomes weakened. In this case, the handle should be separated from the iron portion and be exchanged.

Disclosure of the Invention

The present invention is invented to settle the above-mentioned problems, and the object of the present invention is to provide a tool assembly which can improve a mutual engaging force between a strike portion and a handle and can prevent defacement of the handle and has a good appearance.

In order to achieve the above-mentioned object, there is provide a tool assembly comprising:

a striking portion having a through-hole;

a handle portion an upper portion of which is inserted into the through-hole of the striking portion to act as a knob for movement of the striking portion; and

a first means penetrating through the handle portion and regulating engaging degree between the handle portion and the striking portion by longitudinally moving with respect to the handle portion, thereby deforming the upper portion of the handle portion towards a direction vertical to the striking direction of the striking portion.

A Y-shaped cut-away portion is formed in the upper portion of the handle portion, and a through-hole extending from a lower portion of the Y-shaped cut-away portion to a lower portion of the handle portion, and the first means includes a head of reversed trapezoid, an extending bar extending downward from the head and having a bolt portion on a lower end thereof, and a nut engaged with the bolt portion.

According to another embodiment of the present invention, a recess is formed on the bottom surface of the handle portion, and the first means comprises a head of reversed trapezoid mounted to the Y-shaped cut-away portion, an extending bar integrally formed with the head and extending downward to a predetermined position in the recess through the through-hole and having a bolt portion in the lower end portion thereof, and an elongate nut disposed in the recess to be engaged

with the bolt portion of the extending bar and moving the extending bar downward.

The length of the elongate nut is larger than the depth of the recess such that a predetermined portion thereof is protruded outside the bottom surface of the handle portion, and the thickness of the upper portion of the head is larger than that of the lower portion of the head.

A stress dispersing hole is formed along the lower end of the Y-shaped cut-away portion, a recess communicated with the through-hole is formed on the bottom surface of the handle portion, and the first means comprises a head of reversed trapezoid inserted into the Y-shaped cut-away portion and the stress dispersing hole, a screw shaft detachably engaged with the head and extending downward to a predetermined position in the recess through the through-hole and having a bolt portion in the lower end portion thereof, and an elongate nut disposed in the recess and engaged with the bolt portion of the screw shaft and moving the screw shaft downward.

The cross-section of the stress dispersing hole is substantially circular.

The tool assembly further comprises a second means mounted in the handle portion to absorb vibration generated by the first means, the second means preventing friction between the first means and an inner surface of the handle portion, thereby preventing wear of the inner surface of the handle portion.

The second means comprises a reinforcing member made of a vibration-proof metal, and the reinforcing member comprises a shaft mounted to the bottom portion of the through-hole and having an insertion hole in the interior thereof and a support portion integrally formed with the shaft and positioned on the bottom portion of the recess, the support portion having a shape corresponding to the shape of the bottom portion of the recess.

Brief Description of the Drawings

FIG. 1a is a perspective view for showing a conventional handle of a hammer;

FIG. 1b is a cross-sectional view for showing engaging state of a handle and an iron portion;

FIG. 2 is an exploded perspective view for showing a tool assembly

according to the first embodiment of the present invention;

FIG. 3 is an perspective view for showing the tool assembly shown in FIG. 2;

FIG. 4 is an exploded perspective view for showing a tool bar and metal plates;

FIG. 5 is a perspective view for showing engaging state of the tool bar and the metal plates of FIG. 4;

FIG. 6 is an exploded perspective view for showing a tool assembly according to the second embodiment of the present invention;

FIG. 7 is a perspective view for showing the tool assembly shown in FIG. 6;

FIG. 8 is an exploded perspective view for showing a tool assembly according to the third embodiment of the present invention;

FIG. 9 is an exploded perspective view for showing a tool bar shown in FIG. 8;

FIG. 10 is a cross-sectional view taken along the A-A of FIG. 8; and

FIG. 11 is a perspective view for showing a tool assembly according to the fourth embodiment of the present invention.

Best Mode for Carrying Out the Invention

Hereinafter, the preferred embodiments of the present invention will be explained in detail with reference to the accompanied drawings.

Embodiment 1

FIGs. 2 and 3 shows a tool assembly 150 for a stroke according to the first embodiment of the present invention. FIG. 2 is an exploded perspective view for showing a tool assembly according to the first embodiment of the present invention, and FIG. 3 is an perspective view for showing the tool assembly shown in FIG. 2.

The tool assembly 150 according to the first embodiment includes a striking portion 110 in which a circular, rectangular or the like through-hole 112 is formed, a handle portion 157 the upper portion of which has a cross-section which corresponds to the through-hole 112 of the striking portion 112 and in which a hole 152 which penetrates along the extending direction 200 thereof in the middle thereof, a head 162 which is inserted into the hole 152 of the handle 157 and

regulates the engaging degree of the handle 157 and the striking portion 110 by deforming the upper portion of the handle portion 157 so as to be perpendicular to the striking direction 300 of the striking portion 110 when the head 162 is moved, and an extending bar 160 which extends from the head 162. A nut 170 for determines the position of the extending bar 160 and for minutely moving the extending bar 160 along the extending direction 200 in the hole 152.

The handle 157 is generally made of wood, and the upper portion of the handle 157 is engaged with the through-hole of the striking portion 110 to act as a knob.

A Y-shaped cut-away portion which becomes narrow and is parallel to the striking direction 300 of the striking portion 110 is formed in the upper portion of the handle portion 157. Further, a through-hole 159 which extends from the lower portion of the Y-shaped cut-away portion 159 to the lower portion of the handle portion 157 is formed so as to be form a hole 152 of the handle portion 157.

The extending bar 160 extends downward from the head 162 of reversed trapezoid. When inserted into the handle portion 157 through the Y-shaped cut-away portion 156 from the upper portion of the handle portion 157, the extending bar 160 is guided into the through-hole, and the head 162 is positioned in the Y-shaped cut-away portion 156.

A bolt portion 164 is formed in the lower portion of the extending bar 160 and is engaged with the nut 170. A circular pocket 155 with a predetermined pocket is formed in the lower portion of the handle portion 157. A washer 174 for engaging the nut 172 with the bolt portion 164 through the pocket 155 when the bolt portion 164 of the lower portion of the body of the extending bar 160 is positioned in the pocket 155 is provided. The upper portion of the head 162 supports the front and rear walls of the through-hole 112 of the striking portion 110 and absorbs impact during the work.

When the head 162 is struck downward by another tool, the head 162 pushes both walls of the Y-shaped cut-away portion 156 and increases the thickness of the tip of the handle portion 157, and thus the engaging strength of the tip 154 of the handle portion and the striking portion 110 is increased.

On the other hand, When after the nut 172 is sufficiently released, the lower

end of the extending bar 160 is struck upward by another tool, the extending bar 160 in the handle portion 157 is moved upward, and the head 162 deviates to the outside of the Y-shaped cut-away portion 156, thereby decreasing the thickness of the tip 154 of the handle portion. And then, the engaging strength between the tip 154 of the handle and the striking 110 is weak, the handle portion can be easily separated from the striking portion 110.

It is preferable that the lower end of the extending bar 160 is tapered to minimize the deformation thereof when struck by a tool. It is because it becomes difficult to separate and reassemble the extending bar from and with the handle portion 157 if the lower end of the extending bar 160 is deformed.

Referring to FIG. 4, the tool assembly 150 for a stroke includes at least metal plate 180 which covers the head 162 of the extending bar 160. A hole 182 is formed in the middle of the metal plate 180 and the metal plate 180 is mounted in surrounded relationship to the extending bar 160. The metal plate 180 is bent about the lower portion of the head 162 and covers the head 162 to increase the size of the head 162. The metal plate 180 is provided to increase the thickness of the head 162 when the engaging portion 154 of the handle portion 157 is loosened, thereby increasing the durability of the handle portion 154. Preferably, the metal plates can be chosen to have different thickness.

Hereinafter, the assembling method of the tool assembly is explained.

Firstly, the tip of the handle portion 157 is inserted into the through-hole of the striking portion 110. Thereafter, the head 162 is struck with a tool to insert the extending bar 160 into the hole 152 formed in the handle portion 157. After the insertion, the bolt portion 164 of the lower portion of the extending bar 160 is located in the pocket 155 of the lower portion of the handle portion 157, and the washer 174 and the nut 172 is engaged in turn.

When a user wants to strongly engage the striking portion 110 with the handle portion 157, the nut 172 is rotated to inserted further the extending bar 160 into the handle 157. As a result, the engaging portion 154 of the handle portion 157 becomes enlarged and is firmly engaged with the striking portion 110.

If the tip 154 of the handle portion is loosened due to the long use of the tool assembly 150, the thickness of the head 162 can be increased by covering the

head 162 of the extending bar 160 with the metal plate 180 before the extending bar 160 is inserted into the handle portion 150, as shown in FIG. 5.

Embodiment 2

FIGs. 6 and 7 shows a tool assembly 250 for a stroke according to the second embodiment of the present invention. FIG. 6 is an exploded perspective view for showing a tool assembly according to the second embodiment of the present invention, and FIG. 7 is a perspective view for showing the tool assembly shown in FIG. 6.

As shown in FIGs. 6 and 7, the tool assembly of the second embodiment includes a striking portion 210 in which a through-hole 212 is formed, and a handle portion 257 which has a cross-section corresponding to the through-hole 212 of the striking portion 210 and in which a hole 252 which penetrates along the extending direction 300 thereof is formed in the interior thereof. A head 162 which is inserted into the hole 152 of the handle 157 and regulates the engaging degree of the handle 157 and the striking portion 110 by deforming the upper portion of the handle portion 157 so as to be perpendicular to the striking direction 300 of the striking portion 110 and an extending bar 160 which extends from the head 162 is inserted into the hole 252 of the handle portion 257. A bolt portion 264 is integrally formed in the lower end portion of the extending bar 260.

The through-hole 212 can have a circular, rectangular or the like shape. The handle portion 257 is generally made of wood and has a elliptical shape so that a user can easily grasp the handle portion 257, and has concave portions on the exterior thereof. The upper portion of the handle portion 257 is engaged with the through-hole 212 of the striking portion 210, and the handle portion 257 acts as a knob.

The hole 252 has a Y-shaped cut-away portion 256 which becomes narrow and is parallel to the striking direction of the striking portion 210 and is formed in the upper portion of the handle portion 257 and a through-hole 259 which extends from the lower portion of the Y-shaped cut-away portion 256 to the lower portion of the handle portion 257.

The head 262 has a substantially reversed trapezoid shape and preferably the

thickness of the lower portion of the head 262 is smaller than that of the upper portion of the head 262. When inserted into the handle portion 257 through the Y-shaped cut-away portion 256 from the upper portion of the handle portion 257, the extending bar 260 is guided into the through-hole 259, and the head 262 is positioned in the Y-shaped cut-away portion 256. The upper portion of the head 262 supports the front and rear walls of the through-hole 212 of the striking portion 210 and absorbs impact during the work.

A circular recess 255 communicated with the through-hole 259 is formed in the bottom surface of the handle portion 257. According to another embodiment of the present invention, the recess 255 can have a elliptical or other shape. A end portion of the extending bar 260 in which the bolt portion 264 is formed is extended into the recess 255 through the through-hole 259, and the extended portion is engaged with the elongate nut 330 in the recess 255. It is preferable that the elongate nut 330 is engaged by interposing a washer 320 to prevent the defacement of the engaging portion and reinforce the engaging force.

The elongate nut 330 is engaged with the bolt portion 264, and thus determines the position of the extending bar 260 and moves the extending bar 260 in the extending direction 300 in the hole 252.

The length of the elongate nut 330 is larger than the depth of the recess 255, and thus a predetermined portion of the elongate nut 330 is protruded outside the recess 255. Therefore, a user can regulate the elongate nut 330 by using a spanner or the like. The protruded portion of the elongate nut 255 is engaged with a cap 340, and thus the appearance of the tool assembly 250 is improved.

A plurality of convex portions 342 are formed in the outer surface of the cap 340 to easily rotate the cap 340. A receiving portion 346 is inside the cap 340 to receive the protruded portion of the elongate nut 330. A screw 344 is protruded at the center of the receiving portion 346, and the screw 344 is engaged with the elongate nut 330 and fixedly support the cap 340.

The cap 340 improves the appearance of the tool assembly 250, and minutely moves the extending bar 260 downward so that the engaging force between the striking portion 210 and the tip end portion 254 of the handle 257 can be restored when the engaging force is weakened.

In other words, when the engaging force between the striking portion 210 and the tip end portion 254 of the handle 257, the elongate nut 330 engaged with the screw 344 of the cap 340 moves towards the cap 340 by rotating the cap 340, and thus the extending bar 260 moves downward. Therefore, since the head portion 260 moves downward along the Y-shaped cut-away portion 256, and thus enlarges the distance between the tip end portions 254, the engaging force between the striking portion 210 and the tip end portion 254 of the handle 257. Therefore, when minute regulation of the engaging force is needed, the elongate nut 330 does not need to be rotated by a separate spanner. However, it is preferable that in order to regulate the engaging force, the elongate nut need to be rotated.

On the other hand, a reinforcing member 310 for absorbing the vibration generated by the extending bar 160 and for preventing wear of the inner wall of the through-hole 259 due to the vibration is mounted to the inner surface of the through-hole 259. The reinforcing member 310 is preferably made of a vibration-proof metal to effectively absorb the vibration, and iron metal such as galvanized iron can be used as the reinforcing member 310.

The reinforcing member 310 includes a shaft 314 in which an insertion hole 316 is formed in the interior thereof and a circular support 312 which is integrally formed with the shaft 314 and is positioned on the bottom surface of the recess 255. The outer diameter of the shaft 314 corresponds to the inner diameter of the through-hole 259, and the inner diameter of the insertion hole 316 is preferably a little larger than the outer diameter of the extending bar 260.

When assembled, the extending bar 260 extends through the insertion hole 316, a round portion 318 is formed at the tip of the reinforcing member 310 to minimize the interference between the tip of the extending bar 260 and the tip of the reinforcing member 310. The shaft 314 has such a length that the bolt portion 264 of the extending bar 260 is fully received in the through-hole 259.

Hereinafter, the assembling method of the above-mentioned tool assembly 250 for a stroke will be explained.

Firstly, the tip of the handle portion 257 is inserted into the through-hole 212 of the striking portion 210. Then, the reinforcing member 310 remains inserted into the lower end of the through-hole 259 through the recess 255.

Subsequently, the extending bar 260 is inserted into the through-hole 259 formed in the handle portion 257 by striking the head 262 with a tool. When the insertion is completed, a predetermined portion of the bolt portion 264 formed at the lower portion of the extending bar 260 is located in the recess 255 of the lower portion of the handle portion 257 and the head 262 is located in the Y-shaped cut-away portion 252.

Subsequently, the washer 320 and the elongate nut 330 are engaged in turn. The extending bar 260 is inserted further into the handle portion 257 by rotating the elongate nut 330 with a tool such as a spanner to strongly engage the striking portion 210 with the handle portion 257. Then, since the head 262 is moved downward, the tip end portion 254 of the handle portion 257 is enlarged, thereby strongly engaging with the striking portion 210.

After the striking portion 210 and the tip end portion of the handle portion 257 are sufficiently engaged, the cap 340 is engaged with the elongate nut 330.

When the engaging force between the striking portion 210 and the tip end portion of the handle portion 257 becomes minutely weakened on time, the engaging force is regulated by rotating the cap 340. And, when the engaging force need to be greatly changed, after the cap 340 is separated, the engaging force is regulated by manipulating the elongate nut 330.

The vibration of the extending bar 160 generated during the work is easily reduced by the reinforcing member 310. Further, the reinforcing member 310 prevents the friction between the bolt portion 264 and the inner wall of the through-hole 259.

On the other hand, the tool assembly 250 for a stroke includes at least one metal plate which covers the head 262 of the extending bar 260. The metal plate 180 shown in the first embodiment is used as the metal plate, and the metal plate enlarges the thickness of the head 262 when the engaging portion 254 of the handle portion 257 is loosened.

Embodiment 3

FIG. 8 shows a tool assembly 250A according to the third embodiment of the present invention. As shown in FIG. 8, the tool assembly 250A according to the

third embodiment of the present invention has a structure similar to the tool assembly 250 according to the second embodiment of the present invention.

According to the third embodiment of the present invention, a circular stress dispersing hole 256a is formed along the lower portion of the Y-shaped cut-away portion 256. The stress dispersing hole 256a disperses the force transferred from the head 262 of the extending bar 260A to the handle portion 257, and prevent concentration of the stress.

When the extending bar 260A is inserted into the handle portion 257 from the upper portion of the handle portion 257 through the Y-shaped cut-away portion 256, the extending bar 260A is guided into the through-hole 259 and the head 262 of the extending bar 260A is positioned in the Y-shaped cut-away portion 256 and the stress dispersing hole 256a.

Referring to FIG. 9, the extending bar 260A includes a head 262 and a screw shaft 263 detachably engaged with the head 262. A neck portion 262a which has a nut portion 262b is integrally formed in the lower portion of the head 262, and a bolt portion 260a engaged with the nut portion 262b is formed in the upper portion of the screw shaft 263.

Since the head 262 is detachably engaged with the screw shaft 263, the head 262 can be variously selected so as to have a thickness and a size. Therefore, when the engaging force between the head 262 and the Y-shaped cut-away portion 256 becomes weakened, the head 262 can be changed by a new thicker one.

FIG. 10 is a cross-sectional view taken along the A-A of FIG. 8. Referring to FIG. 10, the through-hole 212 of the striking portion 210 is formed such that the diameter thereof of the upper portion is larger than that of the lower portion, thereby preventing the deviation of the striking portion 210 from the handle portion 257.

Embodiment 4

FIG. 11 shows a tool assembly according to the fourth embodiment of the present invention. As shown in FIG. 11, the Y-shaped cut-away portion 256B formed in the tip end portion of the handle portion can be formed such that it is vertical to the striking direction of the striking portion 210. The cross-section of the head portion

262A of the extending bar corresponds to that of the Y-shaped cut-away portion 256B.

As above-mentioned, the present invention has an advantage in that the engaging force between the handle portion and the striking portion of the tool assembly can be easily regulated.

Further, the vibration generated by the extending bar is absorbed by the reinforcing member, and thus noise can be reduced.

The reinforcing member prevents the friction between the extending bar and the inner wall of the through-hole, and thus prevents wear of the inner surface of the handle portion.

Furthermore, the tool assembly according to the present invention has a good appearance, and since the contacting portion of the head and the handle portion is substantially circular, concentration of the stress can be prevented and splitting of the tip of the handle portion is prevented.

And, since the through-hole of the striking portion is tapered, the deviation of the striking portion can be prevented.

CLAIMS

1. A tool assembly for a stroke comprising:

a striking portion having a through-hole;

a handle portion an upper portion of which is inserted into the through-hole of the striking portion to act as a knob for moving the striking portion; and

a first means penetrating through the handle portion for regulating an engagement between the handle portion and the striking portion, the first means longitudinally moving with respect to the handle portion thereby changing a shape of the upper portion of the handle portion in a direction vertical to a moving direction of the striking portion.

2. A tool assembly according to claim 1, wherein a Y-shaped cut-away portion is formed in the upper portion of the handle portion, a through-hole extending from a lower portion of the Y-shaped cut-away portion to a lower portion of the handle portion is formed in the handle portion, and the first means includes a head having a reversed trapezoid shape, an extending bar extending downward from the head and having a bolt portion on a lower end thereof, and a nut engaged with the bolt portion.

3. A tool assembly according to claim 2, wherein a ~~circular~~ pocket for receiving the nut is formed in a lower end portion of the handle portion.

4. A tool assembly according to claim 2, wherein the tool assembly further comprises at least one metal plate covering the head of the extending bar, the metal plate has a hole in the middle portion thereof, the metal plate is bent about the hole and is overwrapped on the head of the extending bar.

5. A tool assembly according to claim 1, further comprising a second means mounted in the handle portion for absorbing a vibration generated by the first means, the second means preventing a friction between the first means and an inner surface of the handle portion, thereby preventing the inner surface of the handle

portion from wearing.

6. A tool assembly according to claim 5, wherein a Y-shaped cut-away portion is formed in the upper portion of the handle portion, a through-hole extending to the lower end of the handle portion is formed in the lower end of the Y-shaped cut-away portion, a recess communicated with the through-hole is formed on a bottom surface of the handle portion, the first means comprises a head having a reversed trapezoid shape which is mounted on the Y-shaped cut-away portion, an extending bar integrally formed with the head and extending downward to a predetermined position in the recess through the through-hole and having a bolt portion in the lower end portion thereof, and an elongate nut disposed in the recess to be engaged with the bolt portion of the extending bar and to move the extending bar downward, a longitudinal length of the elongate nut is longer than a depth of the recess so that a predetermined portion of the elongate nut protrudes outside the bottom surface of the handle portion, and a thickness of the upper portion of the head is larger than the thickness of the lower portion of the head.

7. A tool assembly according to claim 6, wherein the tool assembly further comprises a cap engaged with a protruded portion of the elongate nut which is protruded outside the bottom surface of the handle portion, the cap is formed on the outer surface thereof with an elliptical convex portion for handling the cap, a receiving portion for receiving the protruded portion of the elongate nut is formed in the inner surface of the cap, and a screw engaged with the nut is provided at a center of the receiving portion.

8. A tool assembly according to claim 6, wherein the second means comprises a reinforcing member made of a vibration-proof metal, and the reinforcing member comprises a shaft mounted on a bottom portion of the through-hole and having an insertion hole in the interior thereof and a support portion integrally formed with the shaft and positioned on the bottom portion of the recess, the support portion having a shape corresponding to a shape of the bottom portion of the recess.

9. A tool assembly according to claim 8, wherein a round portion is formed at a tip of the shaft to minimize inference between a tip of the extending bar and a tip of the reinforcing member, the shaft has a length adapted for receiving the bolt portion of the extending bar, an outer diameter of the shaft corresponds to an inner diameter of the through-hole, and an inner diameter of the insertion hole is larger than an outer diameter of the extending bar.

10. A tool assembly according to claim 1, wherein a Y-shaped cut-away portion is formed in an upper portion of the handle portion, and a stress dispersing hole is formed along a lower end of the Y-shaped cut-away portion, a recess communicated with the through-hole is formed on a bottom surface of the handle portion, and the first means comprises a head having a reversed trapezoid shaped which is inserted into the Y-shaped cut-away portion and the stress dispersing hole, a screw shaft which is detachably engaged with the head and extends downward to a predetermined position in the recess through the through-hole and having a bolt portion in the lower end portion thereof, and an elongate nut disposed in the recess and engaged with the bolt portion of the screw shaft to move the screw shaft downward.

11. A tool assembly according to claim 10, wherein a cross-section of the stress dispersing hole is circular.

12. A tool assembly according to claim 10, wherein a neck portion having a threaded hole is integrally formed in a lower portion of the head, and a bolt portion engaged with the threaded hole is formed in an upper portion of the screw shaft.

13. A tool assembly according to claim 10, wherein a diameter of an upper portion of the through-hole of the striking portion is larger than a diameter of a lower portion of the through-hole so that a deviation of the striking portion from the handle portion is prevented.

FIG. 1a

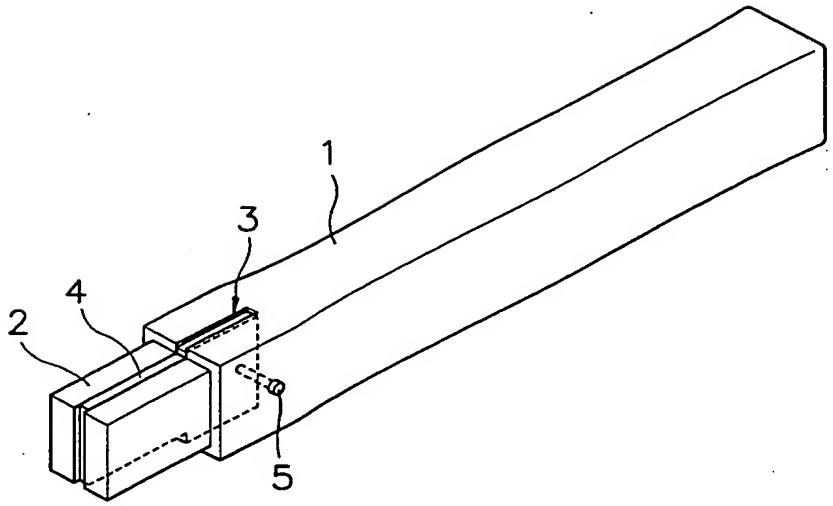


FIG. 1b

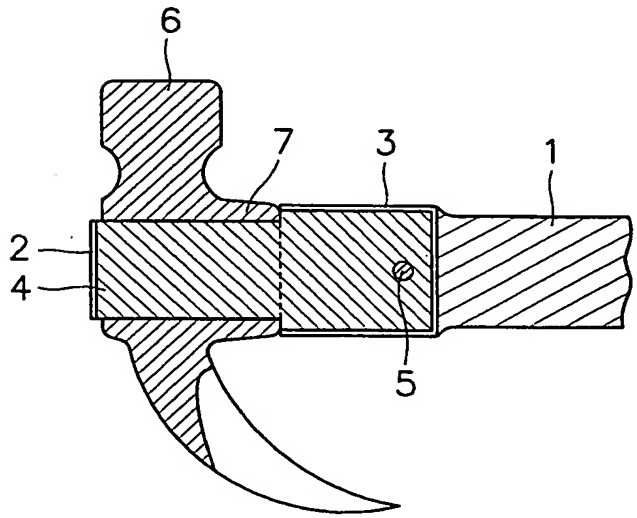


FIG. 2

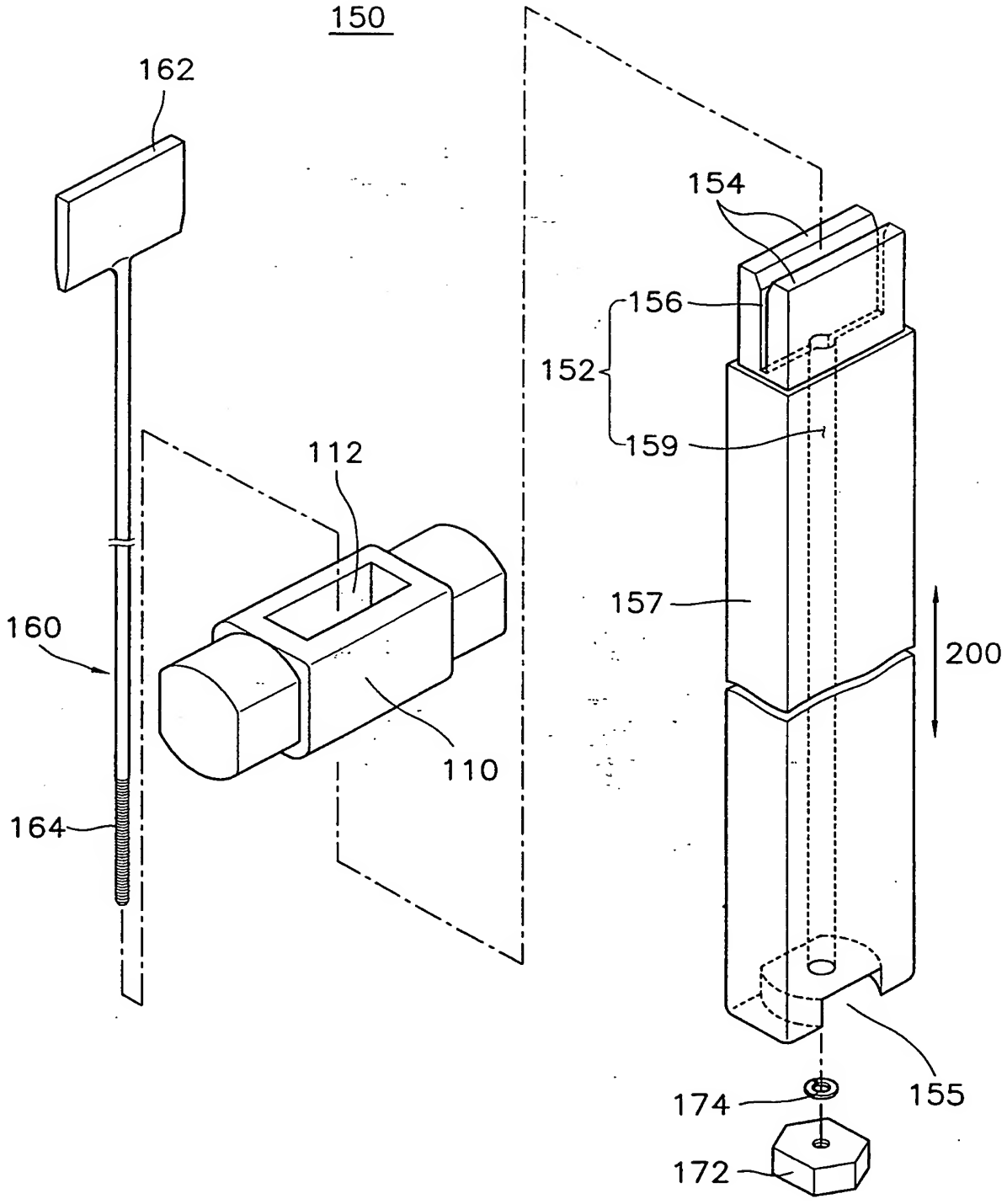


FIG. 3

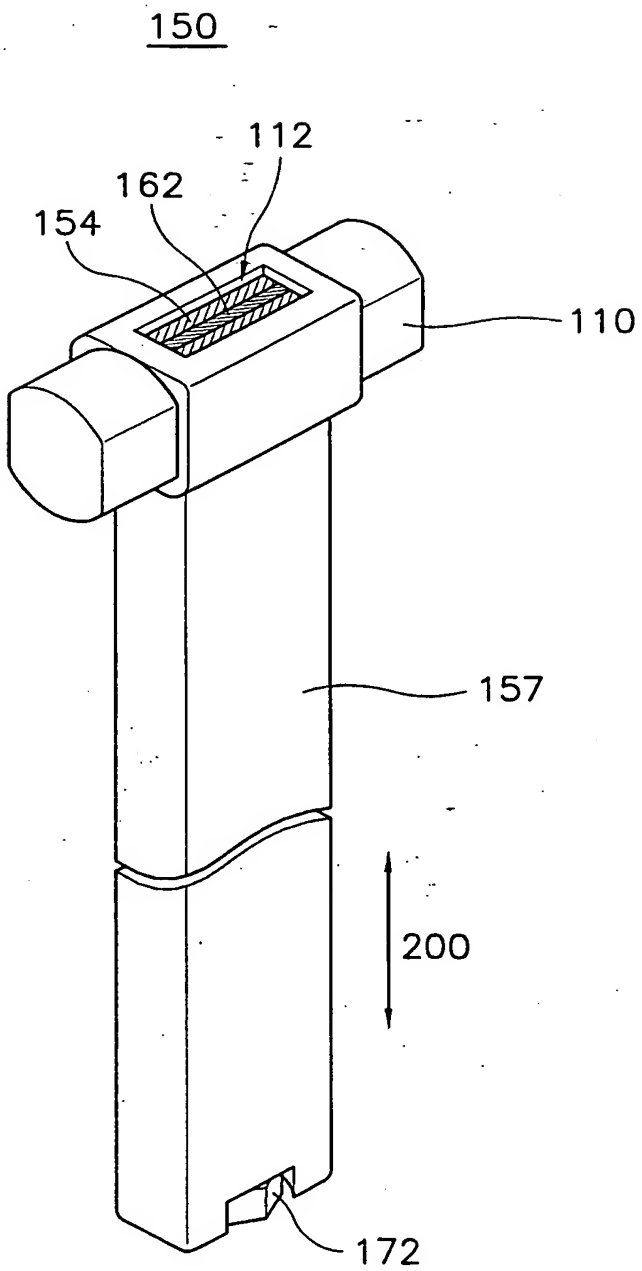


FIG. 4

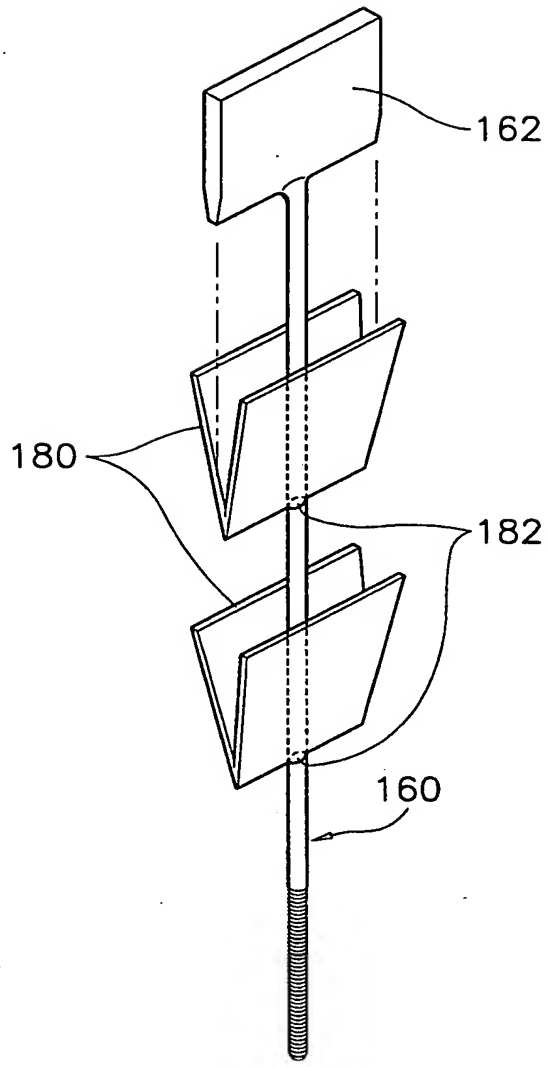


FIG. 5

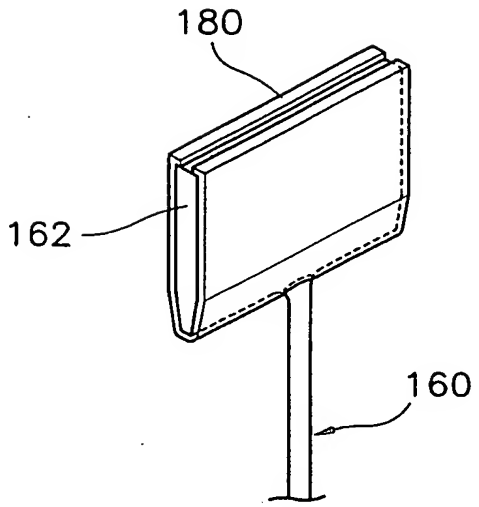


FIG. 6

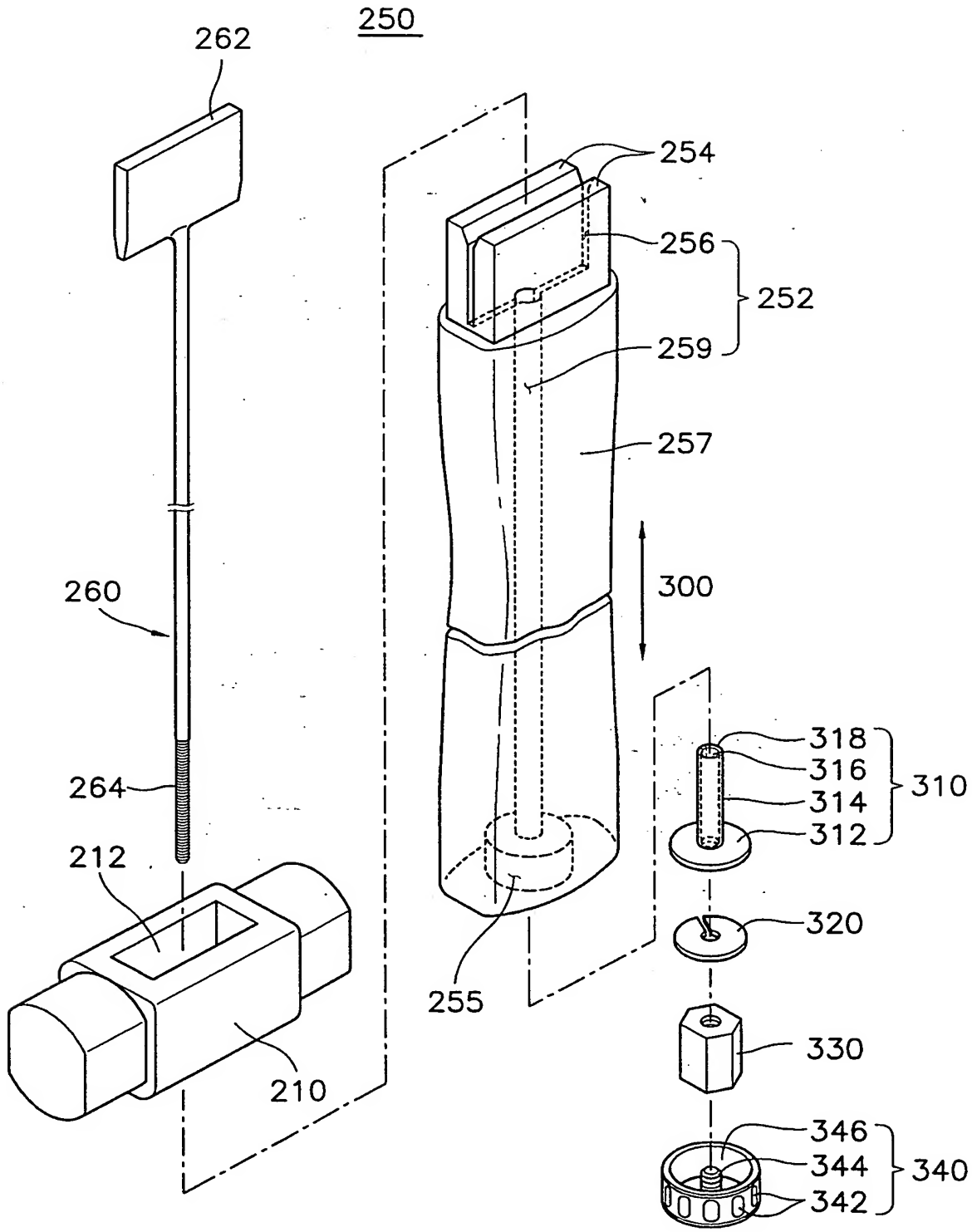


FIG. 7

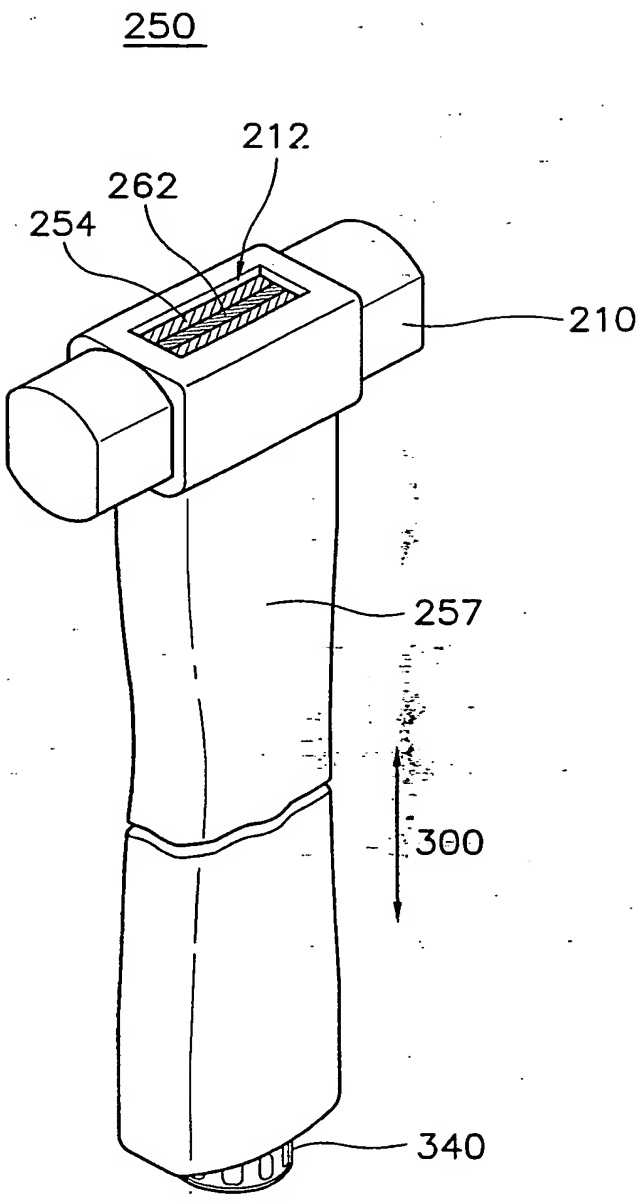


FIG. 8

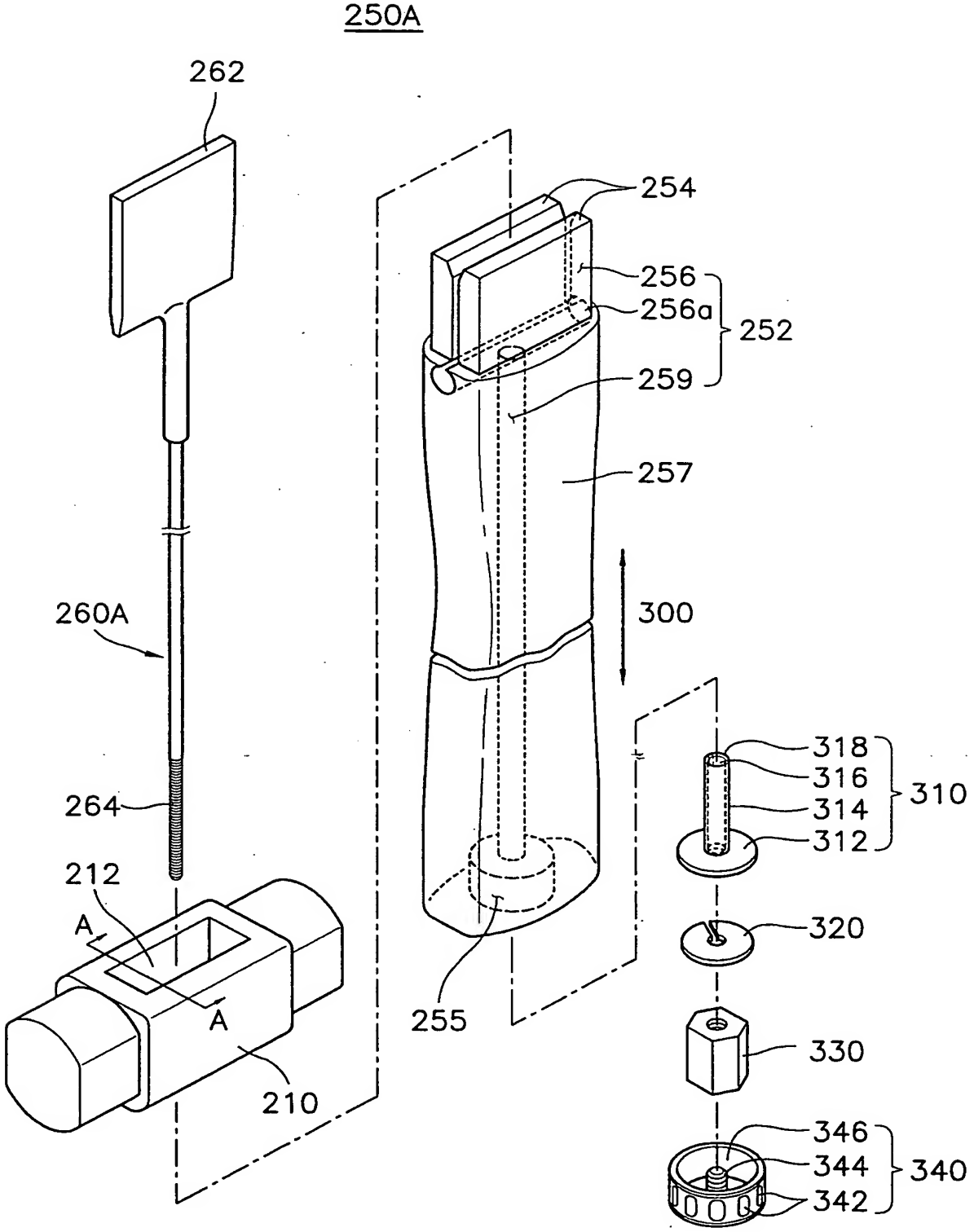


FIG. 9

260A

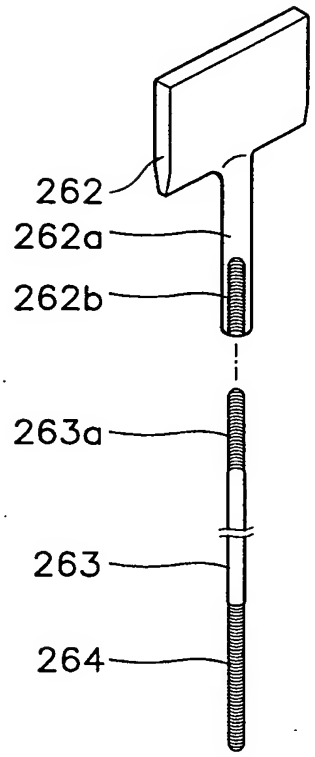


FIG. 10

210

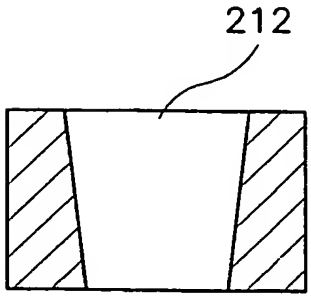
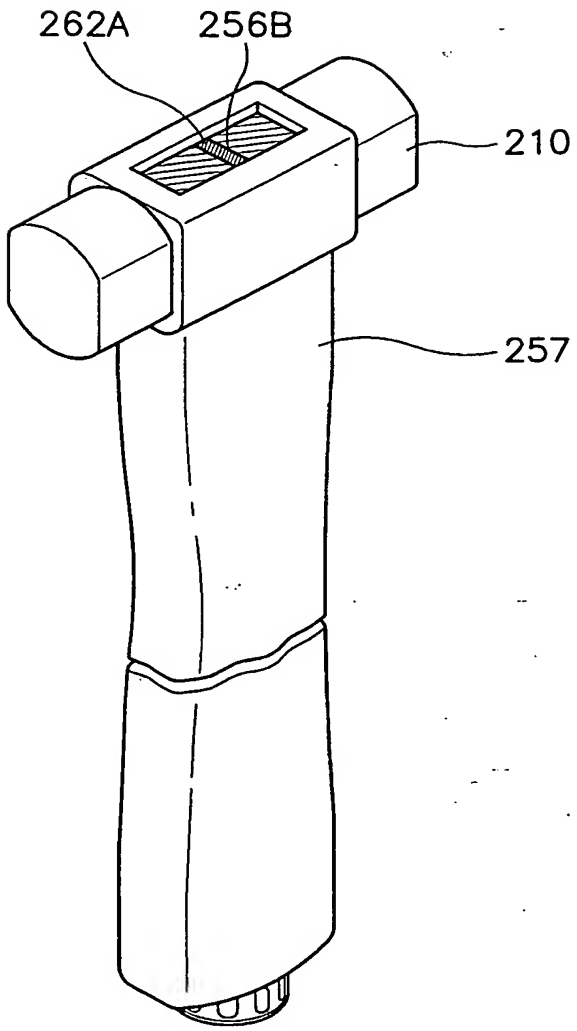


FIG. 11

400



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00598

A. CLASSIFICATION OF SUBJECT MATTER

IPC[7]: B 25 G 3/32; B 25 D 1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[7]: B 25 G 3/32; B 25 D 1/00-7/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 211041 A (BRADBURY), 14 February 1924 (14.02.24), fig.1-3.	1-13
X	GB 19590 A.D. 1905 (WILLIS), 27 September 1906 (27.09.06), fig.1-5.	1-13
X	GB 12796 A.D. 1896 (MILLER), 10 April 1897 (10.04.1897), fig.1-8.	1-13
A	US 2467284 A (WILLIAMS), 12 April 1949 (12.04.49), fig.3,6.	1

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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„&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 December 1999 (13.12.99)	16 February 2000 (16.02.00)
Name and mailing adress of the ISA/AT Austrian Patent Office Kohlmarkt 8-10; A-1014 Vienna Facsimile No. 1/53424/200	Authorized officer Bencze Telephone No. 1/53424/373

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00598

The documents cited in the search report relate to means for fixing hammers and other eyed tools to their handles.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR 99/00598

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
A	211041a	none	
A	19590a	none	
A	12796a	none	
A	2467284a	none	